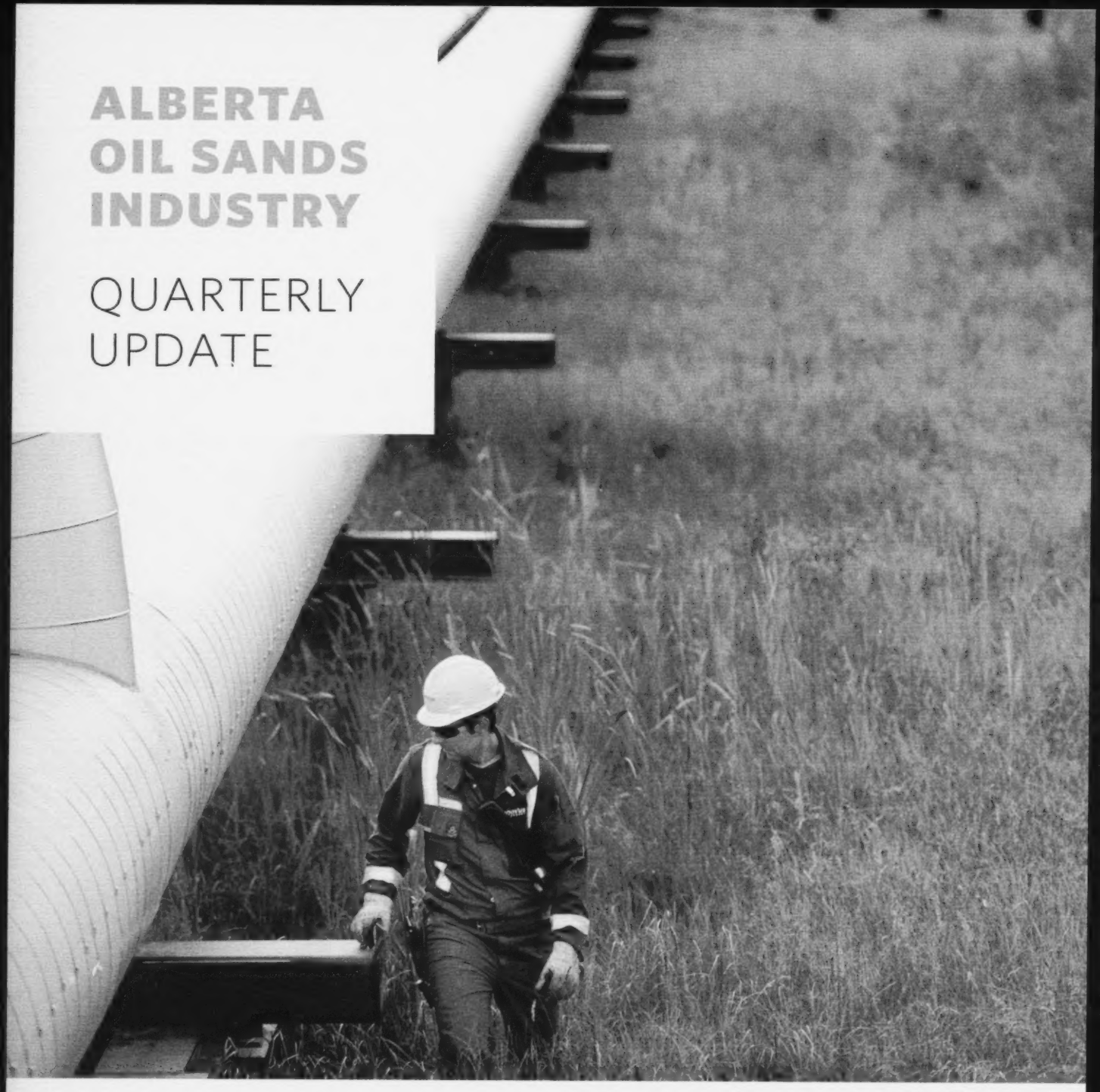
ALBERTA OIL SANDS INDUSTRY

QUARTERLY UPDATE



FALL 2017

Reporting period:
JUNE 7, 2017,
TO SEPT. 11, 2017

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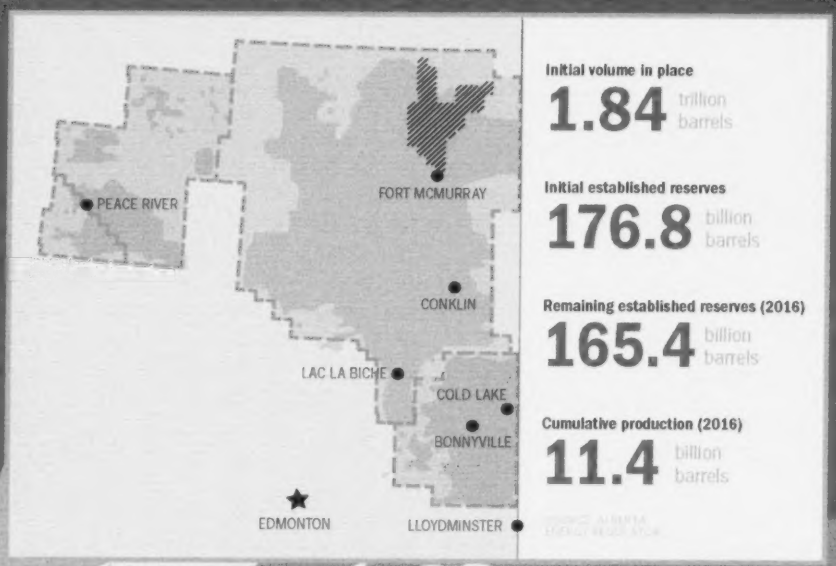
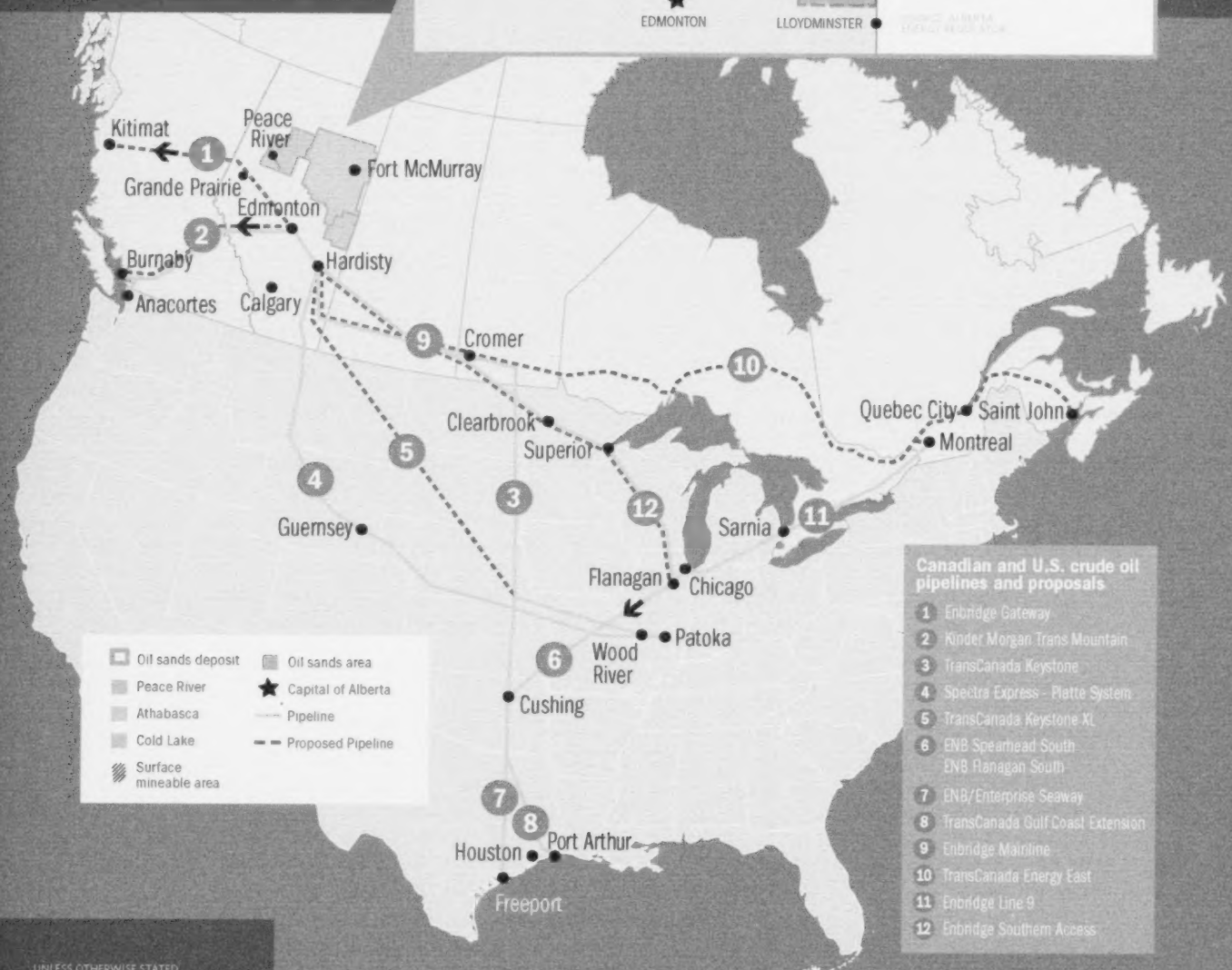
ALBERTA'S OIL SANDS

Canada's oil sands resources exist in three major deposits in Alberta: Athabasca, Cold Lake and Peace River. Athabasca, the largest in size and resource, is home to the surface mineable region. All other bitumen must be produced in situ or by drilling. Currently, the vast majority of oil sands production is exported to U.S. markets.





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MARKET UPDATE

NO NEW MAJOR OIL SANDS GROWTH UNTIL MARKET IMPROVES: EXECS

None of the four executives who appeared on a senior oil sands producers panel at a conference this summer in Calgary predicted greenfield oil sands projects will get the go-ahead anytime soon.

But there was some talk of brownfield developments, debottlenecking work and restarting projects deferred after world oil prices crashed three years ago.

Executives from Suncor Energy, Cenovus Energy and Canadian Natural Resources took part in a panel discussion at TD Securities' annual Calgary oil and gas conference. The topic was capital allocation when WTI crude is trading around US$45-$55/bbl.

"I think we will see a concentration on some brownfield, high-return projects, some de-bottlenecking and—in our case with the Syncrude project—some synergy projects. There may be some interconnectedness there," said Steve Reynish, Suncor's executive vice-president of strategy and corporate development.

NEXT-GEN IN SITU TECHNOLOGY

When asked about the next generation of in situ oil sands technologies, Reynish cited solvent-assisted extraction methods, which are expected to cut capital and operating costs, more effectively mobilize bitumen, reduce water use and cut CO_2 emissions.

On a notional development using the next generation of in situ oil sands technologies, the facility footprint would be about 45 per cent smaller than existing thermal oil facilities, Reynish suggested. About 15 per cent less equipment would be needed. The number of valves on a well pad would be cut to 30 from 230. And construction hours would shrink to 3,000 from 7,000.

"So I give you that level of detail just to give you a flavour for some of the kind of dramatic changes that we think are possible—and, quite frankly, required—to get to the level of capital intensity that would justify new projects in this volatile oil price world going forward," Reynish said. "So, exciting stuff. It's a number of years away, but there's some good engineering work and good technology development work going into making that a reality during the 2020s."

In keeping with Canadian Natural's focus on long-life, low-decline assets, the company's top priority is completion of Phase 3 of the Horizon oil sands mine and upgrading operation.

Chief financial officer Corey Bieber said Phase 3 is on track for tie-in during a turnaround in late summer and for first production in the fourth quarter. "So that's all going very well."

Beyond that, Canadian Natural's current capital allocation favours projects with less capital risk that can be brought on stream faster, albeit with higher decline rates. Bieber noted the company is spending about $1 billion on Horizon versus about $2.5 billion to $3 billion elsewhere in western Canada and internationally.

As for how the company allocates capital with oil prices hovering around US$45/bbl, he said, "the focus at $45 is the same as $55. It's really optimizing capital returns. So if it doesn't make sense to invest at $45, we're not going to do that."

Cenovus deferred three oil sands projects in late 2014 and early 2015. Last December, the company announced the restarting of one of those, the 50,000-bbl/d Christina Lake Phase G. That SAGD project is expected to be on stream in 2019.

Growth from the next generation of in situ technology, with dramatically reduced capital costs, is expected to become a reality in the 2020s.

The in situ oil sands producer has said the other two deferred projects—Foster Creek Phase H and Narrows Lake Phase A—will have to await debt reduction. Cenovus borrowed money to help pay for the $17.7-billion acquisition of oil sands and Deep Basin assets from ConocoPhillips.

"We will not be starting another oil sands project this year," said Al Reid, Cenovus's executive vice-president of environment, corporate affairs, legal and general counsel.

"And likely the first one that would get restarted is Foster Creek H because it is further along," he said. Cenovus recently raised its production target for the proposed Foster Creek Phase H to 40,000 bbls/d from 30,000 bbls/d.

Also, Reid said Cenovus won't have two oil sands construction projects running concurrently.

However, thanks to its acquisition from ConocoPhillips, the company now has short-cycle assets in the Deep Basin to which capital will also be allocated. For 2017, Cenovus is running a three-rig program in the Deep Basin and will spend about $170 million. ■

majorprojects.alberta.ca

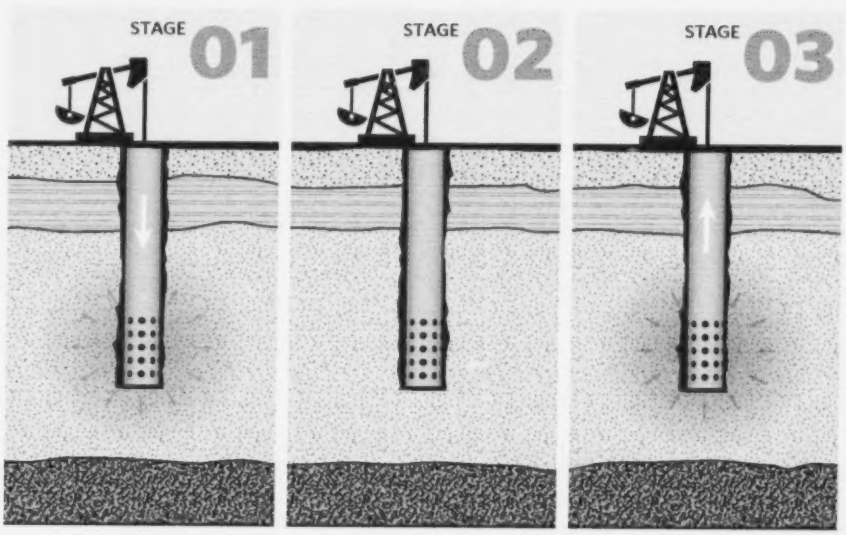
ALBERTA MAJOR PROJECTS

An inventory of private and public sector projects in Alberta valued at $5 million or greater

127 oil & gas, pipeline and industrial projects valued at $176.9B

Alberta Government

RESOURCE + TECHNOLOGY SPOTLIGHT



CYCLIC STEAM STIMULATION (CSS)

BACKGROUND

In Alberta, 80 per cent of oil sands reserves (about 135 billion barrels) are buried too deep below the surface for open pit mining and can only be accessed through in situ methods. "In situ" is Latin for "in place."

Recognizing the potential, producers have worked for decades to successfully recover this resource. In 1966, Imperial Oil patented cyclic steam stimulation (CSS), which it has been using on a commercial scale at its Cold Lake thermal project since 1985.

HOW IT WORKS

CSS, which has also been called "huff and puff," involves injecting high-pressure steam into the reservoir for several weeks, followed by several weeks where the reservoir is left to "soak."

The heat softens the bitumen, and the water dilutes and separates the bitumen from the sand. The pressure creates cracks and openings through which the bitumen can flow back into the steam injector wells, which are converted to production mode using rod pumping systems.

WHERE IT WORKS/ CURRENT STATUS

The use of CSS is largely isolated to the Cold Lake oil sands region, where bitumen deposits are much deeper than in the Athabasca region, where the majority of Alberta's bitumen resource is present.

Imperial Oil is the largest CSS operator, producing approximately 160,000 bbls/d at Cold Lake in the second quarter of 2017. The company completed a 40,000-bbl/d expansion to its Cold Lake project in early 2015.

Canadian Natural Resources, which also started operating its Primrose/Wolf Lake CSS project at Cold Lake in 1985, produced an average of 75,000 bbls/d in the second quarter of 2017.

THE FUTURE

Like all Alberta thermal oil sands operators, CSS producers are developing technologies to make new projects competitive with other oil plays, including U.S. shale development, in terms of both costs and environmental footprint as the price of oil remains low.

For Imperial Oil's CSS operations, two of these technologies are liquid addition to steam for enhancing recovery (LASER) and cyclic solvent process (CSP).

Patented in 2005, LASER involves adding a volume of light hydrocarbon liquids (a diluent) to injected steam. Adding solvent to the steam increases the amount of oil that can be produced per unit of injected steam, thereby reducing both water and greenhouse gas (GHG) intensity per barrel of bitumen produced.

CSP is a non-thermal process that injects solvent instead of steam to recover bitumen. It has the potential to virtually eliminate water use and reduce direct GHG emissions by more than 90 per cent. Imperial's $100-million pilot facility at Cold Lake initiated solvent injection in 2014 and continues to evaluate CSP. ■

WHAT'S NEW
PROJECTS

Four of the six major process areas for the new Fort Hills mining project have been turned over from construction to operations, and the project remains on track to achieve first oil before the end of the year, partner Teck Resources said in its second-quarter earnings statement.

The project is now over 92 per cent complete, with an increasing focus on commissioning and operations.

"Activity in the quarter also included the utilities plant entering into the completion and turnover to operations phase," Suncor, the project's majority owner and operator, said in its second-quarter report. "Construction at the secondary extraction facility, which is the final area to be completed to bring the project to first oil, continued in the quarter, and the project remains on target to start production at the end of 2017."

Suncor raised its cost expectation from $15.1 billion to $17 billion in February, tempered by a production capacity increase from 180,000 to 194,000 bbls/d that would maintain the cost at $84,000 per flowing barrel.

In July, the Sturgeon Refinery's pipeline connection to the oil sands went into commercial service.

The Cold Lake pipeline system transported 554,000 bbls/d of diluted bitumen from the Cold Lake region to the Edmonton region in the second quarter, according to Inter Pipeline's second-quarter results.

The Sturgeon Refinery will have capacity to process 50,000 bbls/d of bitumen into 80,000 bbls/d of diesel. The project is currently undergoing equipment testing as it advances toward start-up. First diesel is expected in October 2017, followed by the official start of commercial operations in spring 2018.

The troubled Long Lake SAGD project might finally be able to earn a profit, its owner says.

The upgrader at Long Lake has been offline since a fatal explosion at the project in January 2016. Four months later, SAGD operations were temporarily suspended as the Fort McMurray wildfire swept across the site, though minimal damage was reported.

CNOOC says that production has returned to rates seen prior to the explosion, averaging 37,100 bbls/d in the first half of 2017 compared to 38,100 in the first half of 2015 (production dropped to 21,400 bbls/d in the first half of 2016).

Long Lake started operating in 2008 and has never reached its full plant production capacity of 72,000 bbls/d. The company says costs are being controlled through optimization of organizational structure, management efficiencies, processing procedures and the project's blending program.

First oil has been achieved at the expansion of one of Alberta's longest running SAGD projects, south of Fort McMurray at Hangingstone.

Production is already exceeding 1,000 bbls/d, Japan Petroleum Exploration Co. (JAPEX), the parent company of operator Japan Canada Oil Sands (JACOS), says.

The Hangingstone expansion is expected to ramp up to full rates of 20,000 bbls/d by the second half of 2018.

JACOS has operated a 6,000-bbl/d SAGD pilot at Hangingstone since 1999. This project has not been producing since May 2016, when JACOS initiated a shut down due to market conditions. JAPEX now says the pilot restart will not occur.

Two of the largest SAGD projects in the oil sands underwent major maintenance turnarounds in the second quarter that marked milestones for their corporate owners.

Suncor Energy's 200,000-bbl/d Firebag project north of Fort McMurray underwent the first major turnaround of its most recent expansion phases, Stages 3 and 4. The two phases, which came online in 2011 and 2012, respectively, have total production capacity of 85,000 bbls/d.

Meanwhile, Cenovus Energy executed the largest maintenance turnaround in its company history at the 180,000-bbl/d Foster Creek SAGD project in the south Athabasca region. ■

WHAT'S NEW
BUSINESS

A new study funded by the Canadian Association of Petroleum Producers shows that Quebec benefits greatly from oil sands development.

According to the study, over 12 months in 2014-15 the oil sands industry provided Quebecers with 16,200 jobs, $1.25 billion in GDP and $215 million in government revenues. Of the approximately 16,200 jobs "created or maintained" by oil sands producers expenditures in Quebec, more than 7,500 were on the Island of Montreal.

IHS Markit has increased its expectations for oil sands growth to 2026 by about 160,000 bbls/d since last year as companies achieve better performance at existing facilities.

"This is principally because we expect more oil to come from existing facilities as a result of the increase in utilization we are seeing from existing operations," says IHS Markit senior director Kevin Birn.

Operating projects have not only continued to produce through the drop in oil prices but have done so at decreasing cost, he says.

That said, the current surge in oil sands volumes is anticipated to drop off before 2020 as a long-aftershock of lower prices and falling investment since 2014 plays out on supply additions into the early part of the next decade.

IHS Markit forecasts that in 2026 oil sands production could be one million bbls/d higher than today (exceeding 2.5 million bbls/d in 2016), although the majority of that increase may come over the next two years.

Canadian Natural Resources has only been the operator of the Athabasca Oil Sands Project (AOSP) since May 31, but the company has already identified a major cost saving opportunity through synergies with its own Horizon mine.

The cost-saving opportunity will come from Horizon tailings management, Canadian Natural says. It is now deferring $315 million in spending to next year based on integration opportunities with the AOSP.

"As we go forward," says chief operating officer Tim McKay, "there's a real opportunity to take people's technical expertise and learnings from both sites and combine them to come up with a better plan and better way to execute [mature fine tailings] into 2018."

IHS Markit has increased its oilsands prodcution forecast based on higher utilization rates at existing projects.

Reduced OPEC oil exports to North America are benefitting Canadian crude exporters, according to financial information services firm Fitch Ratings.

As supplies of lower-priced heavier crude blends with higher sulphur content exported by OPEC have waned, the key price differential between benchmark light WTI crude and heavier crude blends entering the U.S. market has narrowed despite U.S. shale production ramping up to 9.4 million bbls/d compared to 8.8 million bbls/d at the year-end of 2016.

Over the longer term, however, Fitch Ratings doesn't expect the narrow differential to last.

"The Fort Hills project (194,000 bbls/d of bitumen) is expected online later this year. Increased pipeline capacity from Canada into the U.S. should also contribute to an easing of spreads."

While Cenovus Energy's total spending with Aboriginal businesses dropped in 2016, these firms got a bigger share of the Cenovus investment pie.

Last year, 19 per cent of Cenovus's capital spend was with Aboriginal companies, the thermal oil sands producer said in its 2016 corporate responsibility report.

The company plans to continue to make working with Aboriginal businesses a priority. "From 2009 to early 2017, we surpassed $2 billion in cumulative spend doing business with local and Aboriginal companies in our operating areas," the company said in its report. ■

WHAT'S NEW

ENVIRONMENT + TECHNOLOGY

University of Calgary researchers are trying to eliminate tailings ponds by separating bitumen, water, and the clay fraction at the processing stage of oil sands mining using ionic liquids. Ionic liquids clump the clay particles together so they can be removed rapidly from process water. Solids would go back into mine pits ready for reclamation, and ionic liquids would be recovered and reused.

Steven Bryant and his research team have already shown the process works—at the laboratory level—and a patent is pending.

The research team is currently looking for an opportunity to scale up their discovery and says interest is high thanks to engagement with Canada's Oil Sands Innovation Alliance (COSIA).

ConocoPhillips has invested the extra capital cost of installing flow control devices (FCDs) in wells at the new Surmont 2 SAGD project and says this is paying off to the point that it is deploying the technology beyond its original plans.

About 30 per cent of the well pairs at Surmont 2 were originally equipped with FCDs when the 118,000-bbl/d SAGD expansion was commissioned in mid-2015.

Since achieving first oil in September 2015, ConocoPhillips says the devices have achieved impressive results.

"It's not every day that you develop a single technology that can give you a 100 per cent increase in the cumulative oil production over 12 months' time from your well pairs," ConocoPhillips executive vice-president Al Hirshberg told the audience at the company's 2016 analyst and investor meeting in New York.

"These FCDs have been so effective that we've even developed a way to retrofit them into wells that we drilled that didn't originally have them."

According to TOP Analysis, FCDs are designed to promote a more uniform distribution of steam along the injection well and fluid drawdown to the production well. They are also often used as a way of ensuring pump longevity by reducing the likelihood of steam interaction with artificial lift.

Cenovus has targeted next year to hit the milestone of deploying solvent-assisted SAGD technology across a full well pad, with sanction of its first full-scale commercial solvent-assisted SAGD project expected in 2019.

The technology is expected to decrease costs and improve margins while providing meaningful greenhouse gas emissions reductions.

This year and next Cenovus says it plans three solvent-driven process tests at its Foster Creek project, followed by commercializing the technology on a pad level.

Eventually, the company plans to convert both Foster Creek and Christina Lake, which together currently produce about 360,000 bbls/d, to its solvent-assisted process.

Migratory fish can detect oil sands process-affected water (OSPW) and will leave a contaminated area with no long-term negative effects on their senses, according to a University of Alberta study.

Toxicologist Keith Tierney and his colleagues exposed the fish to OSPW and followed the effects on their olfactory nerves. He said that much like how humans would walk away from a burning building until they were far enough that the smoke doesn't affect their breathing, so too would fish swim away from a plume of OSPW until the water is diluted enough that toxicity is undetectable.

Tierney said that if the fish couldn't escape the fluid, it's likely they would suffer moderate sensory impairment.

Researchers at the University of Calgary have demonstrated self-sealing bitumen balls in the laboratory, representing a potential breakthrough pipeline-free solution for Alberta crude to reach markets in a cheap and sustainable manner.

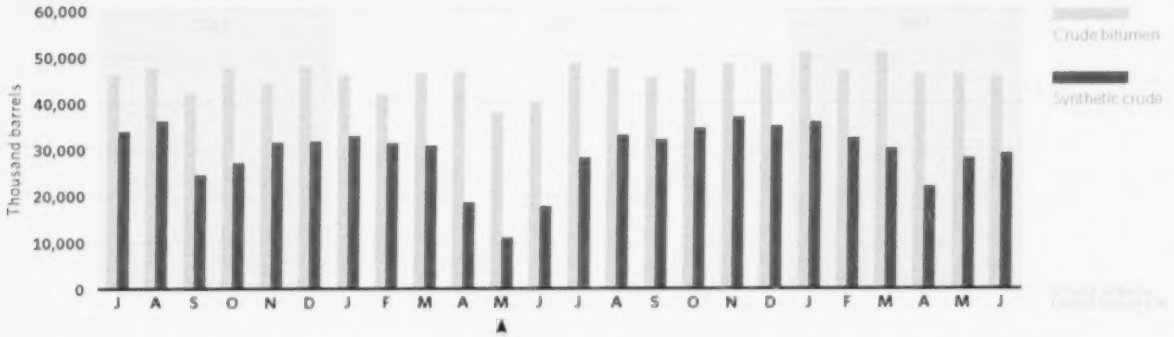
The fundamentals of the technology are mature, the U of C says, and the team will now scale up.

"We are going to build a one-barrel-per-day unit, going from our super-small scale to that," said team lead Ian Gates. "By one year the goal is a several-hundred-barrel-per-day unit."

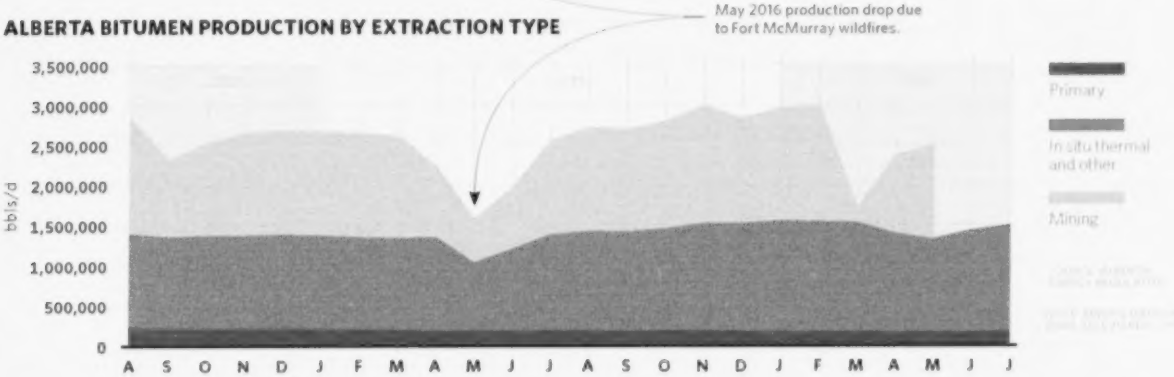
Researchers developed the process to make pellets of varying sizes at the wellhead, using roughly the same energy as it takes to dilute bitumen for liquid transport. ■

OIL SANDS DATA

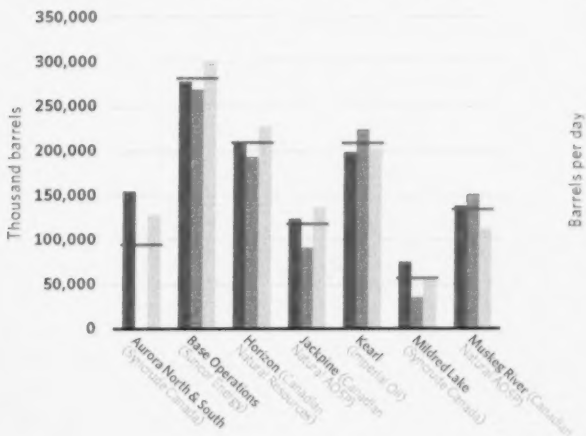
ALBERTA CRUDE BITUMEN AND SYNTHETIC CRUDE PRODUCTION



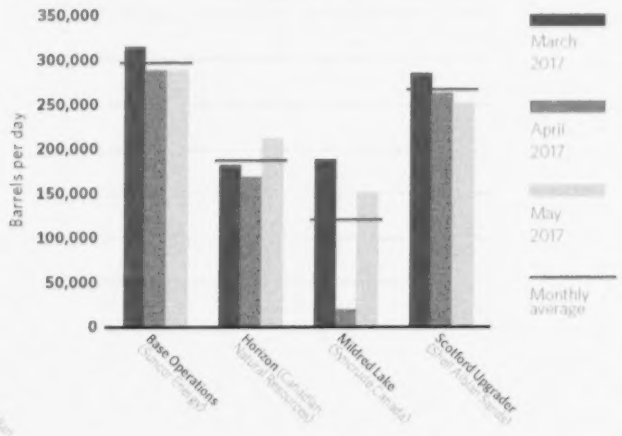
ALBERTA BITUMEN PRODUCTION BY EXTRACTION TYPE



OIL SANDS MINING PRODUCTION BY PROJECT



OIL SANDS UPGRADER PRODUCTION BY PROJECT



THERMAL OIL SANDS PRODUCTION BY PROJECT
MAY 2017 – JUL. 2017

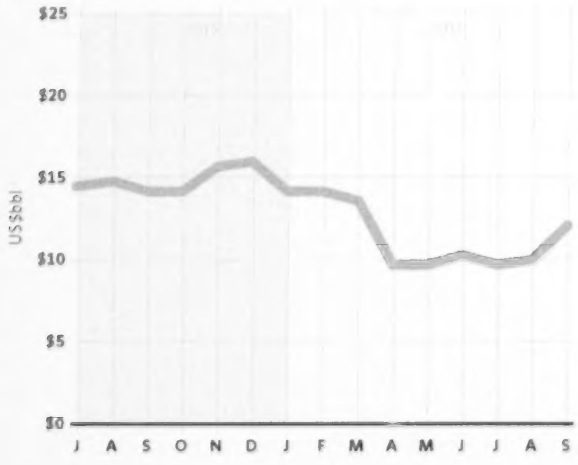
(Barrels per day)

COMMERCIAL SCHEMES					
COMPANY	FIELD	MAY	JUN	JUL	MONTHLY AVERAGE
Cenovus Energy Inc.	Christina Lake	201,531.60	205,783.00	205,036.90	204,117.2
Suncor Energy Inc.	Firebag	82,002.70	116,938.00	191,951.00	130,297.2
Imperial Oil Limited	Cold Lake	152,538.80	163,984.70	162,478.60	159,667.4
Cenovus Energy Inc.	Foster Creek	113,812.70	164,711.40	167,644.70	148,722.9
Devon Canada Corporation	Jackfish	118,127.10	80,109.30	75,121.20	91,119.2
ConocoPhillips Canada Limited	Surmont	126,110.80	124,511.50	115,893.90	122,172.1
Canadian Natural Resources Limited	Primrose & Wolf Lake	73,919.70	70,997.60	77,163.00	74,026.8
MEG Energy Corp.	Christina Lake	57,624.20	73,109.70	77,568.30	69,434.1
CNOOC Limited	Long Lake	39,719.70	41,462.10	43,082.90	41,421.6
Husky Energy Inc.	Sunrise	39,230.40	38,044.20	40,734.50	39,336.4
Canadian Natural Resources Limited	Kirby South	26,983.40	41,675.50	36,684.90	35,114.6
Suncor Energy Inc.	Mackay River	19,054.90	36,494.90	36,200.90	30,583.6
Husky Energy Inc.	Tucker	23,427.70	18,461.10	16,500.40	19,463.1
Athabasca Oil Corporation	Leismer Demonstration	20,326.80	19,717.70	19,775.30	19,939.9
Pengrowth Energy Corporation	Lindbergh	13,664.00	13,972.40	13,569.00	13,735.1
Connacher Oil and Gas Limited	Great Divide	12,657.40	12,746.70	12,611.90	12,672.0
Athabasca Oil Corporation	Hangingstone	8,760.70	9,234.60	8,223.40	8,739.6
OSUM Oil Sands Corp.	Orion	7,286.40	7,259.20	7,432.40	7,326.0
Canadian Natural Resources Limited	Peace River/Carmon Creek	4,977.80	4,880.70	5,191.00	5,016.5
Sunshine Oilsands Ltd.	West Ells	1,947.10	1,748.10	1,301.70	1,665.6
Brion Energy Corporation	Mackay River	901.8	1,911.20	5,068.30	2,627.1
Japan Canada Oil Sands Limited	Hangingstone	...	...	891.7	891.7
BlackPearl Resources Inc.	Blackrod	460.7	376.7	464.4	433.9
Obsidian Energy Ltd.	Harmon Valley South Pilot	...	...	...	...
Canadian Natural Resources Limited	Peace River	35.2	46.5	51.6	...
Total Commercial		**1,145,101.8**	**1,248,176.9**	**1,320,641.9**	**1,238,523.5**

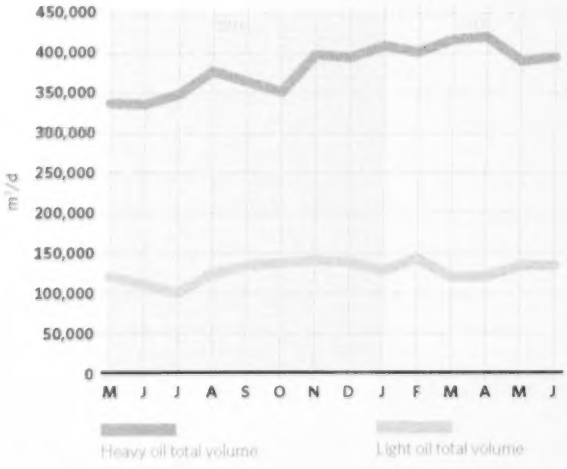
SOURCE: GOVERNMENT OF ALBERTA ENERGY REGULATOR

CRUDE OIL PRICE DIFFERENTIAL (WTI-WCS)

Recorded until September 11, 2017



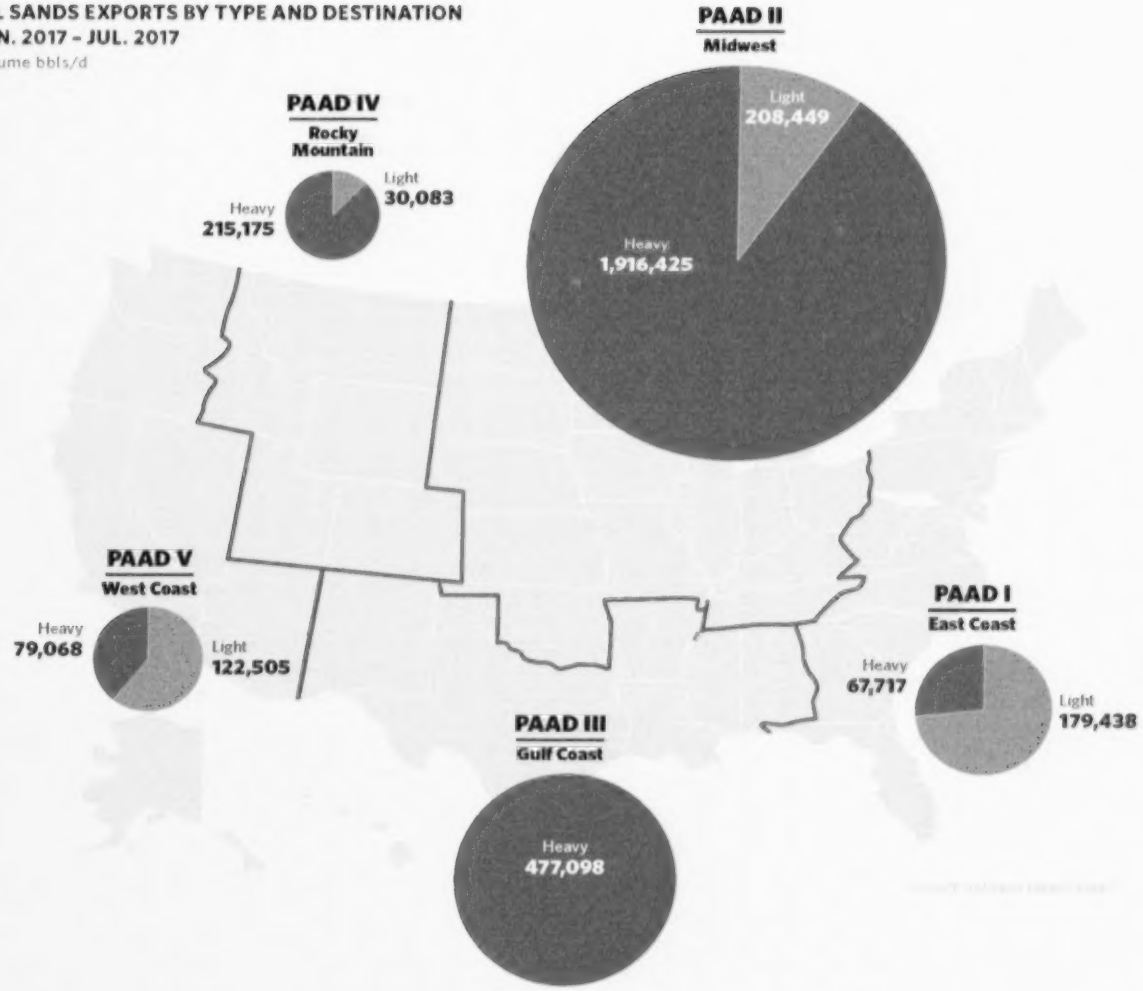
CANADIAN CRUDE OIL EXPORTS



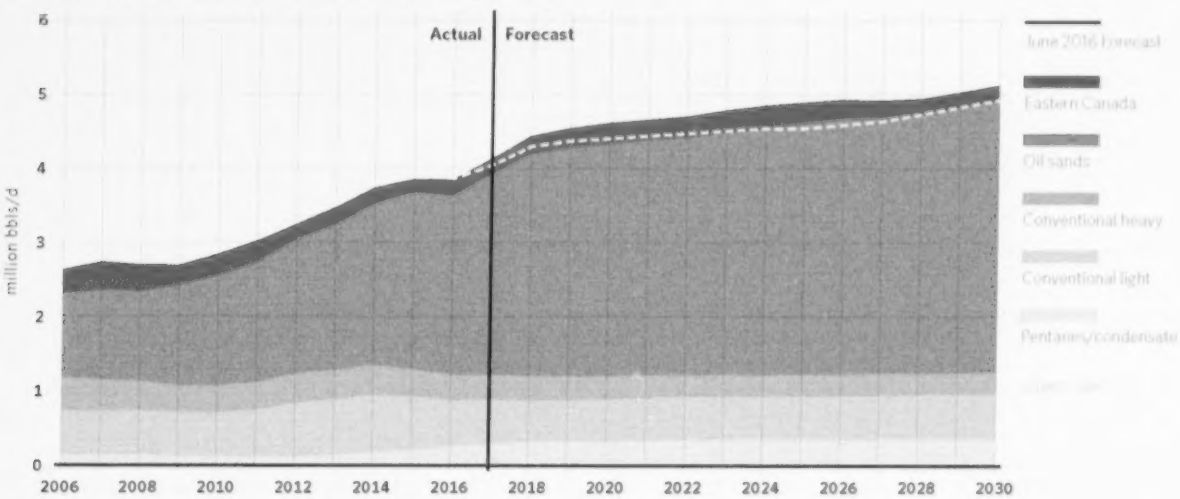
SOURCE: NATIONAL ENERGY BOARD

OIL SANDS EXPORTS BY TYPE AND DESTINATION
JAN. 2017 – JUL. 2017

Volume bbls/d



CANADIAN OIL SANDS & CONVENTIONAL PRODUCTION



GLOSSARY OF OIL SANDS TERMS

A

ASPHALTENES

The heaviest and most concentrated aromatic hydrocarbon fractions of bitumen.

B

BARREL

The traditional measurement for crude oil volumes. One barrel equals 42 U.S. gallons or 159 litres. There are 6.29 barrels in one cubic metre of oil.

BITUMEN

Naturally occurring, viscous mixture of hydrocarbons that contains high levels of sulphur and nitrogen compounds. In its natural state, it is not recoverable at a commercial rate through a well because it is too thick to flow. Bitumen typically makes up about 10 per cent by weight of oil sand, but saturation varies.

C

COGENERATION

The simultaneous production of electricity and steam, which is part of the operations of many oil sands projects.

COKING

An upgrading/refining process used to convert the heaviest fraction of bitumen into lighter hydrocarbons by rejecting carbon as coke. Coking can be either delayed coking (semi-batch) or fluid coking (continuous).

CONDENSATE

Mixture of extremely light hydrocarbons recoverable from gas reservoirs. Condensate is also referred to as a natural gas liquid and is used as a diluent to reduce bitumen viscosity for pipeline transportation.

CONVENTIONAL CRUDE OIL

Mixture of mainly pentane and heavier hydrocarbons recoverable at a well from an underground reservoir and liquid at atmospheric pressure and temperature. Unlike bitumen, it flows through a well without stimulation and through a pipeline without processing or dilution.

CRACKING

An upgrading/refining process for converting large, heavy molecules into smaller ones. Cracking processes include fluid cracking and hydrocracking.

CYCLIC STEAM STIMULATION (CSS)

An in situ production method incorporating cycles of steam injection, steam soaking and oil production. The steam reduces the viscosity of the bitumen and allows it to flow to the production well.

D

DENSITY

The heaviness of crude oil, indicating the proportion of large, carbon-rich molecules, generally measured in kilograms per cubic metre (kg/m^3) or degrees on the American Petroleum Institute (API) gravity scale. In western Canada, oil up to 900 kg/m^3 is considered light-to-medium crude; oil above this density is deemed as heavy oil or bitumen.

DILBIT

Bitumen that has been reduced in viscosity through the addition of a diluent such as condensate or naphtha.

DILUENT

A light hydrocarbon blended with bitumen to enable pipeline transport. See Condensate.

E

EXTRACTION

A process unique to the oil sands industry that separates the bitumen from the oil sand using hot water, steam and caustic soda.

F

FROTH TREATMENT

The means to recover bitumen from the mixture of water, bitumen and solids "froth" produced in hot-water extraction (in mining-based recovery).

G

GASIFICATION

A process to partially oxidize any hydrocarbon, typically heavy residues, to a mixture of hydrogen and carbon monoxide. Can be used to produce hydrogen and various energy by-products.

GROUNDWATER

Water accumulations below the Earth's surface that supply fresh water to wells and springs.

H

HEAVY CRUDE OIL

Oil with a gravity below 22 degrees API. Heavy crudes must be blended or mixed with condensate to be shippe by pipeline.

HYDROCRACKING

Refining process for reducing heavy hydrocarbons into lighter fractions using hydrogen and a catalyst; can also be used in upgrading bitumen.

HYDROTRANSPORT

A slurry process that transports water and oil sand through a pipeline to primary separation vessels located in an extraction plant.

HYDROTREATER

An upgrading/refining process unit that reduces sulphur and nitrogen levels in crude oil fractions by catalytic addition of hydrogen.

I

IN SITU

A Latin phrase meaning "in its original place." In situ recovery refers to various drilling-based methods used to recover deeply buried bitumen deposits.

IN SITU COMBUSTION

An enhanced oil recovery method that works by generating combustion gases (primarily CO and CO_2) downhole, which then push the oil toward the recovery well.

L

LEASE

A legal document from the province of Alberta giving an operator the right to extract bitumen from the oil sand existing within the specified lease area. The land must be reclaimed and returned to the Crown at the end of operations.

LIGHT CRUDE OIL

Liquid petroleum with a gravity of 28 degrees API or higher. A high-quality light crude oil might have a gravity of about 40 degrees API. Upgraded crude oils from the oil sands run around 30–33 degrees API (compared to 32–34 for Light Arab and 37–40 for West Texas Intermediate).

M

MATURE FINE TAILINGS

A gel-like material resulting from the processing of clay fines contained within the oil sands.

O

OIL SANDS

Bitumen-soaked sand deposits located in three geographic regions of Alberta: Athabasca, Cold Lake and Peace River. The Athabasca deposit is the largest, encompassing more than 42,340 square kilometres. Total in-place deposits of bitumen in Alberta are estimated at 1.7 trillion to 2.5 trillion barrels.

OVERBURDEN

A layer of sand, gravel and shale between the surface and the underlying oil sand in the mineable oil sands region that must be removed before oil sands can be mined.

P

PERMEABILITY

The capacity of a substance, such as rock, to transmit a fluid, such as crude oil, natural gas or water. The degree of permeability depends on the number, size and shape of the pores and/or fractures in the rock and their interconnections. It is measured by the time it takes a fluid of standard viscosity to move a given distance. The unit of permeability is the Darcy.

PETROLEUM COKE

Solid, black hydrocarbon that is left as a residue after the more valuable hydrocarbons have been removed from the bitumen by heating the bitumen to high temperatures.

PRIMARY PRODUCTION

An in situ recovery method that uses natural reservoir energy (such as gas drive, water drive and gravity drainage) to displace hydrocarbons from the reservoir into the wellbore and up to the surface. Primary production uses an artificial lift system in order to reduce the bottomhole pressure or increase the differential pressure to sustain hydrocarbon recovery, since reservoir pressure decreases with production.

R

RECLAMATION

Returning disturbed land to a stable, biologically productive state. Reclaimed property is returned to the province of Alberta at the end of operations.

S

STEAM ASSISTED GRAVITY DRAINAGE (SAGD)

An in situ production process using two closely spaced horizontal wells: one for steam injection and the other for production of the bitumen/water emulsion.

SURFACE MINING

Operations to recover oil sands by open-pit mining using trucks and shovels. Less than 20 per cent of Alberta's oil sands resources are located close enough to the surface (within 75 metres) for mining to be economic.

SYNTHETIC CRUDE OIL

A manufactured crude oil comprised of naphtha, distillate and gas oil-boiling range material. Can range from high-quality, light, sweet bottomless crude to heavy, sour blends.

T

TAILINGS

A combination of water, sand, silt and fine clay particles that is a byproduct of removing the bitumen from the oil sand through the extraction process.

TAILINGS SETTLING BASIN

The primary purpose of the tailings settling basin is to serve as a process vessel, allowing time for tailings water to clarify and silt and clay particles to settle so that the water can be reused in extraction. The settling basin also acts as a thickener, preparing mature fine tails for final reclamation.

THERMAL RECOVERY

Any in situ process where heat energy (generally steam) is used to reduce the viscosity of bitumen to facilitate recovery.

U

UPGRADING

The process of converting heavy oil or bitumen into synthetic crude either through the removal of carbon (coking) or the addition of hydrogen (hydroconversion).

V

VISCOSITY

The ability of a liquid to flow. The lower the viscosity, the more easily the liquid will flow.

Alberta

Capital Investment Tax Credit (CITC)

Are you an Alberta-based business conducting manufacturing, processing or tourism infrastructure activities? Are you looking to make an investment of at least $1 million in value?

If so, you can apply for a 10 per cent tax credit on eligible capital expenditures, up to a maximum of $5 million.

For more information on how and when to apply for the CITC, visit: jobsplan.alberta.ca or email citc.program@gov.ab.ca

We listened to business leaders' ideas to create the Alberta Jobs Plan. This included implementing new tax credits, providing training for aspiring entrepreneurs, adding supports for established ones, increasing access to capital and cutting the small business tax.

Together, we are creating new jobs, diversifying Alberta's economy and making the lives of Albertans better.

OIL SANDS CONTACTS

OIL SANDS PRODUCERS

Athabasca Oil www.atha.com
Baytex Energy www.baytex.ab.ca
BlackPearl Resources www.blackpearlresources.ca
Brion Energy www.brionenergy.com
Canadian Natural Resources www.cnrl.com
Cenovus Energy www.cenovus.com
Chevron Canada www.chevron.ca
CNOOC www.cnoocltd.com
Connacher Oil and Gas www.connacheroil.com
ConocoPhillips Canada www.conocophillips.ca
Devon Canada www.dvn.com
Enerplus Resources Fund www.enerplus.com
E-T Energy www.e-tenergy.com
Grizzly Oil Sands www.grizzlyoilsands.com
Harvest Operations www.harvestenergy.ca
Husky Energy www.huskyenergy.ca
Imperial Oil www.imperialoil.ca
Japan Canada Oil Sands www.jacos.com
Koch Exploration Canada www.kochexploration.ca
Korea National Oil www.knoc.co.kr
Laricina Energy www.laricinaenergy.com
Marathon Oil www.marathon.com
MEG Energy www.megenergy.com
Nexen www.nexeninc.com
North West Upgrading www.northwestupgrading.com
Nsolv www.nsolv.ca
Oak Point Energy www.oakpointenergy.ca
Occidental Petroleum www.oxy.com
Osum Oil Sands www.osumcorp.com
Pan Orient Energy www.panorient.ca
Paramount Resources www.paramountres.com
Pengrowth Energy www.pengrowth.com
PetroChina www.petrochina.com.cn/ptr
PTT Exploration and Production www.pttep.com
Shell Canada www.shell.ca
Sinopec www.sinopecgroup.com/group/en
Statoil Canada www.statoil.com
Suncor Energy www.suncor.com
Sunshine Oilsands www.sunshineoilsands.com
Syncrude www.syncrude.ca
Teck Resources www.teck.com
Total E&P Canada www.total-ep-canada.com
Touchstone Exploration www.touchstoneexploration.com
Value Creation Group www.vctek.com

ASSOCIATIONS/ORGANIZATIONS

Alberta Chamber of Resources www.acr-alberta.com
Alberta Chambers of Commerce www.abchamber.ca
Alberta Energy www.energy.gov.ab.ca
Alberta Energy Regulator www.aer.ca
Alberta Environment and Parks www.aep.alberta.ca
Alberta Innovates www.albertainnovates.ca
Alberta Innovation and Advanced Education www.eae.alberta.ca
Alberta's Industrial Heartland Association www.industrialheartland.com
Building Trades of Alberta www.bta.ca
Canada's Oil Sands Innovation Alliance www.cosia.ca
Canadian Association of Geophysical Contractors www.cagc.ca
Canadian Association of Petroleum Producers www.capp.ca
Canadian Heavy Oil Association www.choa.ab.ca
In Situ Oil Sands Alliance www.iosa.ca
Lakeland Industry & Community Association www.lica.ca
Natural Resources Conservation Board www.nrcb.ca
Oil Sands Community Alliance www.oscaalberta.ca
Oil Sands Secretariat www.energy.alberta.ca
Petroleum Technology Alliance Canada www.ptac.org

FOR MORE INFORMATION, PLEASE VISIT US AT
www.albertacanada.com

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www.albertacanada.com/business/statistics/oil-sands-quarterly.aspx